



ONLINE ANALYTICAL PROCESSING

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ABSTRACT-As the time is being passed business process is becoming more & more complex and can not be run without automating the various processes of business. To make a successful business in this competitive environment we need to make good decisions for the problems to be encounter or to make more profit. We need to analyze the business terms and its measure from different perspective. Data warehouse of a big enterprise is based on star schema data model which is around dimensions of business. From the operational day to day system, we are moving towards analytical system. OLAP is a system to analyze or query this multidimensional data.

Typical applications of OLAP include business reporting for sales, marketing, management reporting, budgeting and forecasting etc. OLAP consists of some basic analytical operations: consolidation, drill down, rollup, slicing and dicing.

OLAP is all about making cubes and analyzing the multidimensional data cubes. The proposed system which we have developed has all the basic features of OLAP and some advance like cross dimensional calculation and powerful calculation. We are analyzing the sales data. Our system is based on HOLAP data model. we are using MDX(multidimensional query language) for querying the multidimensional data. This system is built over Microsoft analysis services package of Sql server 2005.Client Interface is made in Java. The approach which we have started implementing is to preserve the privacy of data for different users of the system. we have given roles to various users and have applied the security to cells and dimensions of the cubes.

applications like sales analysis, ERP data analysis, Planning/forecasting & profitability analysis, budgeting, balance scorecard etc. First of all,we have to take a data source in relational tables from which we have to make the OLAP server in multidimensional cubes. We can implement one the model of OLAP from three that is ROLAP, MOLAP or HOLAP. We are implementing the HOLAP model here. These models will be described below. After making the OLAP server we analyze the multidimensional data to report and to make decisions. In the Presentation layer we use in the client side the GUI program which uses MDX language that is multidimensional language to access the multidimensional data and analyze it.

The Three-layer Architecture Of traditional OLAP framework which is shown in figure 1.The first layer is data warehouse server which connects to the fundamental database system, and manages the data consistency and data sharing at enterprise level.The second layer is OLAP server. it separates various analysis action of OLAP analysis according to the end users' requests.

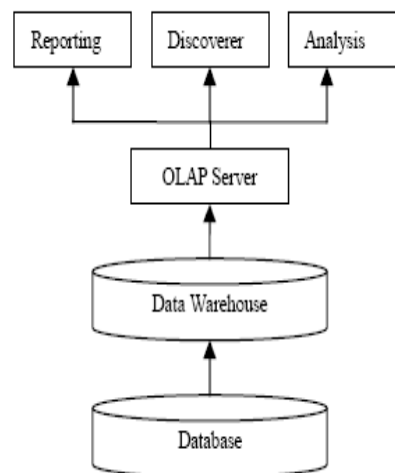


Figure 1.

I. INTRODUCTION

Online analytical system is a system to analyze the multidimensional data. This is used in various



The third layer is reporting tools which visually display the results to end user based on the process of OLAP server in the forms of multi-dimensional table, pie chart, bar chart and etc.

II OLAP MULTIDIMENSIONAL ANALYSIS OPERATION

OLAP analysis can enable the user to observe the data. From multidimensional and different perspective through Carrying on the Slice, Dice, and Roll up/Drill down, Rotate to the data of multidimensional organization, so that they better understand the information included in the data. The elementary operation of OLAP analysis includes:

1. ROLL UP

It involves the aggregation of data. This can involve simple roll-ups or complex grouping involving interrelated data.

2. DRILL DOWN

It is opposite of roll up that is it shows the detailed data from the consolidated data.

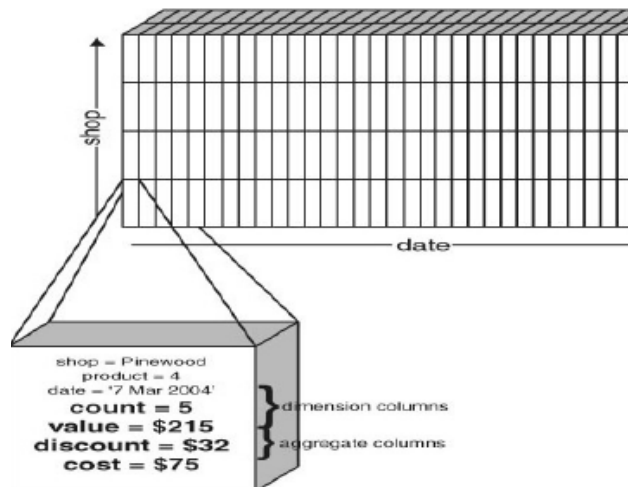


Figure.2 Slice

3. SLICING & DICING

It is a combination of looking at a subset of data based on more dimensions.

4. PIVOTING

It is a visualization operation that rotates the axes in view in order to provide an alternate presentation of data.

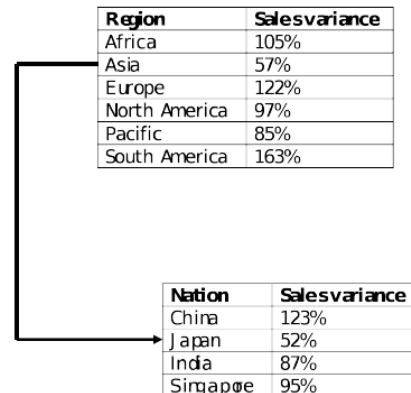


Figure3. Drill Down

III. OLAP MODELS

The Main Component in an OLAP system is OLAP server which sits between Client and database. OLAP server understands how data is organized in the database and has special functions for analyzing the database.

3.1 ROLAP

It relies on manipulating the data stored in relational tables. Each action of slicing and dicing is equivalent to adding a “Where” clause in sql statement. It can handle large amount of data. Performance is slow and has a limited functionality because it can not perform complex operations.

3.2 MOLAP

In this data is stored in multidimensional cubes. Cubes are built for fast data retrieval. Can perform complex calculations. It can handle limited amount of data. Additional investment required because of proprietary tools.



3.3 HOLAP

It attempts to combine the advantage of both ROLAP and MOLAP. It represents the summary information on cubes and when detailed information is required it drill downs from cubes to relational database.

Store: Delhi

Year	Cheee Spread	Club Milk	Club Strawberry	Spade Turkey	Golden Waffles
2000	115	345	521	130	357
1999	232	790	346	564	125

Table2.

IV. ANALYSIS QUERIES

4.1 Query1: Compare total sales for all stores, product by product, between years 2000 and 1999.

We will apply the query on aggregated fact table by year which shows 2 rows for year 2000 and 1999 and one column for all products.

```
Select Sum(sales_fact_year.store_sales) As sale,
product.product_name As brand,
time_by_day.the_year, from
time_by_day,sales_fact,product, store Where
time.year =2000 or time.year=1999 Group by
product.brand_name, time_by_day.the_year
```

Year	Cheee Spread	Club Milk	Club Strawberry	Spade Turkey	Golden Waffles
2000	315	835	843	1130	842
1999	500	1790	908	1564	344

Table1.

4.2 Query2: Show Comparison of Sales by individual stores, product by product, between years 2000 and 1999.

We will apply the sale query on same aggregated fact table but this time we add store name in group by clause so that we retrieve the data by individual stores. Store data is shown one store per page.

```
Select Sum(sales_fact_year.store_sales) As sale,
product.product_name As brand,
time_by_day.the_year, store.store_name, from
time_by_day, sales_fact,product, store Where
time.year =2000 or time.year=1999 Group by
product.brand_name, time_by_day.the_year,
store.store_name
```

V. CONCLUSION

After applying various analysis queries on all the three models that is ROLAP, MOLAP, HOLAP, we find that ROLAP take a big time generate the result set for large data sets. MOLAP is good in performance but if we are required the fine granular data then we don't have it. So, HOLAP is good in all which takes advantage of both.

VI. REFERENCES

1. What-if OLAP Queries with Changing Dimensions L.V.S. Laxamanan, A. Russakovasky, V.Shashikant, Department of Computer Science, University of British Columbia
2. Effectiveness of OLAP-based Sales Analysis in Retail Enterprises ChunhuaJu1 ,Minghua HanCollege of Computer Information & Engineering, ZheJiangGongShangUniversity,ZheJiang, China
3. An Overview of Data Warehousing and OLAP technology”, SurjitChaudhary, *Sigmod Record*, March 1997 (with UmeshDayal). Tutorials Presented at 1996 VLDB, 1997SIGMOD and 1998 IEEE ICDE.
4. Building OLAP Tools over Large Databases”, Rui Oliveira, Jorge Bernardino, ISEC (Institute of superior Engineering of Columbia)
5. <http://mondrian.pentaho.com/documentation/mdx.php>